

Application Serial No.: 10/725,426
Reply to Office Action dated February 4, 2005

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-18 are presently active in this case, Claims 1-7 having been amended in a non-narrowing manner and Claims 8-18 having been added by way of the present Amendment.

The Applicants note that the Information Disclosure Statement filed on February 26, 2004, contained a reference "AW" under the "Other References" section that was not initialed as being considered. The Applicants respectfully request acknowledgement that the "AW" reference was considered by the Examiner.

In the outstanding Official Action, the abstract of the disclosure was objected to because of minor informalities. Accordingly, a new Abstract of the Disclosure has been added in place of the original abstract. Accordingly, the Applicants request the withdrawal of the objection to the abstract.

Claims 3-7 were objected to under 37 CFR 1.75(c) as being in improper multiple dependent form. Accordingly, the claims have been amended to remove all improper multiple dependent claims. The Applicants therefore request the withdrawal of the objection to Claims 3-7.

Claims 1 and 2 were rejected under 35 U.S.C. 103(a) as being unpatentable over Geittner et al. in view of Roba (U.S. Patent No. 4,608,070) and Davis (U.S. Patent No.

4,664,689). For the reasons discussed below, the Applicants traverse the obviousness rejection.

The basic requirements for establishing a *prima facie* case of obviousness as set forth in MPEP 2143 include (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, (2) there must be a reasonable expectation of success, and (3) the reference (or references when combined) must teach or suggest all of the claim limitations. The Applicants submit that a *prima facie* case of obviousness has not been established in the present case because the references, either taken singularly or in combination, do not teach or suggest all of the claim limitations, and there is no suggestion or motivation to modify the references to arrive at the presently claimed invention.

Claim 1 of the present application recites a method of manufacturing an optical fibre by carrying out one or more chemical vapour deposition reactions in a substrate tube, which method comprises the following steps i) supplying one or more doped or undoped glass-forming precursors to the substrate tube, ii) supplying a stoichiometric excess of oxygen to the substrate tube, iii) setting up a reaction in the substrate tube between the reactants supplied in steps i) and ii) so as to effect the deposition of one or more glass layers on the interior of the substrate tube, iv) subjecting the substrate tube thus coated in step iii) to a collapsing process so as to form a preform, and finally v) drawing said preform into an optical fibre while heating the preform and subsequently cooling said optical fibre. Claim 1

further recites that the Reynolds number is in accordance with the formula $120 < Re < 285$ during the deposition process according to step iii), wherein the Reynolds number is calculated on the basis of the reactants supplied to the substrate tube in step i) and step ii), under the temperature and pressure conditions that prevail in the interior of the substrate tube during step iii).

The Applicants respectfully submit that the cited references, either taken singularly or in combination, do not disclose or suggest all of the limitations recited in Claim 1 of the present application. For example, none of the cited references disclose or suggest a method of manufacturing an optical fibre where the Reynolds number is in accordance with the formula $120 < Re < 285$ during the deposition process according to step iii). Thus, a *prima facie* case of obviousness cannot be established for Claim 1.

The Geittner et al. reference teaches that on increasing the deposition rate and the gas flow, quantitative deposition of compact SiO_2 was only maintained if the inner tube diameter and the microwave power were increased appropriately (see page 818, second column, fourth paragraph). Although it is stated in the second paragraph on page 819 that the pressure drop along the substrate tube obeys the Hagen-Poiseuille-equation for laminar flow, the Geittner et al. reference does not teach that during the deposition process the Reynolds number is an important parameter, nor does the Geittner et al. reference teach that the Reynolds number should be in accordance with the formula $120 < Re < 285$. From the experimental parameters given in Figure 2 of the Geittner et al. reference, one of ordinary skill in the art cannot conclude that the Reynolds number is in accordance with the formula $120 < Re < 285$ during the

deposition process, as recited in Claim 1, in order to obtain an SiO₂ (and any dopants) incorporation efficiency of more than 90%.

Furthermore, the Geittner et al. reference teaches that the GeO₂ incorporation efficiency decreases from 85% to 62% if *m* is increased from 0.5 to 2.0 g/min and if the temperature T₀ at the outer wall of the substrate tube is kept constant (see page 819, first column, last paragraph). From this information the person of ordinary skill in the art cannot deduce that the Reynolds number, as recited in present Claim 1, is a critical value for the incorporation efficiency.

The Official Action concludes that it is inherent in the process disclosed in the Geittner et al. reference that the Reynolds numbers are within the Applicants' stated formula of 120<Re<285, since the Geittner et al. reference's incorporation efficiencies range from 80-100% and the plasma must be stable in order to produce the preform at such high incorporation efficiencies. However, the Applicants respectfully disagree with such a conclusion. The Applicants submit that such a conclusion can only be reached by improperly using hindsight considerations. The Geittner et al. reference does not mention the Reynolds number, let alone its specific range of 120-285. Furthermore, the Geittner et al. reference does not relate the incorporation efficiency with the Reynolds number.

As supported by experimental data in the present application (see the table on page 7, lines 10-15 of the originally filed specification), the Applicants determined that the deposition efficiency is lower than 90% if the Reynolds number is higher than 285, which value is critical, therefore. The Geittner et al. reference does not give any pointer one of

ordinary skill in the art that such a small range of Reynolds numbers is critical, because the Geittner et al. reference is not concerned with Reynolds numbers, let alone the specific range as claimed in present Claim 1.

The Roba reference fails to supplement the deficiency noted above with respect to the Geittner et al. reference. The Roba reference relates to a process for manufacturing optical fiber preforms at a high deposition rate. In column 2, lines 5-12, it is clearly stated that the deposition quality in terms of uniform dopant concentration is strictly dependent upon the flow of the gases carrying the glass particles. Such flow should provide laminar conditions. Furthermore, to keep the flow laminar, it is necessary to modify the reactor dimensions, by increasing its diameter (see column 2, lines 63-66). The Roba reference teaches to apply a Reynolds number less than 500, hence the reactant flow is laminar (see column 4, lines 47-59). However, the Roba reference does not teach that the Reynolds number is in accordance with the formula $120 < Re < 285$ during the deposition process, as recited in present Claim 1. The present inventors have thus determined that in order to obtain an SiO_2 (and any dopants) incorporation efficiency of more than 90%, the Reynolds number must not exceed 285. In contrast, the Roba reference teaches that the relation (3) (see column 6, lines 21-25) is important to obtain a high efficiency, which relation (3) does not have any correlation with the Reynolds number (see column 6, lines 34-38). On basis of this teaching, one of ordinary skill in the art could not find any hint in the Roba reference to use a specific range of Reynolds numbers in order to obtain an SiO_2 (and any dopants) incorporation efficiency of more than 90%.

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Finally, the Davis reference fails to supplement the deficiency noted above with respect to the Geittner et al. and Roba references. The Davis reference relates to an optical fiber cooler wherein an optical fiber is passed through the axial length of an enclosure having means for passing cryogenic gas through its wall. The Davis reference does not relate to a method of manufacturing optical fiber by carrying out one or more chemical vapour deposition reactions in a substrate tube. Therefore, the Davis reference does not provide any information about Reynolds numbers, let alone its importance thereof.

The Applicants respectfully submit that the rejection is based on the improper application of hindsight considerations. It is well settled that it is impermissible simply to engage in hindsight reconstruction of the claimed invention, using Applicants' structure as a template and selecting elements from the references to fill in the gaps. *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991). Recognizing, after the fact, that a modification of the prior art would provide an improvement or advantage, without suggestion thereof by the prior art, rather than dictating a conclusion of obviousness, is an indication of improper application of hindsight considerations. Simplicity and hindsight are not proper criteria for resolving obviousness. *In re Warner*, 397 F.2d 1011, 154 USPQ 173 (CCPA 1967).

Accordingly, the Applicants respectfully request the withdrawal of the obviousness rejection of Claim 1.

The dependent claims are considered allowable for the reasons advanced for Claim 1 from which they depend. These claims are further considered allowable as they recite other

features of the invention that are neither disclosed nor suggested by the applied references when those features are considered within the context of Claim 1.

Claim 1 was provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claim 1 of copending Application Ser. No. 10/165620 in view of the Geittner et al. reference or alternatively in view of the Roba reference.

The Applicants respectfully traverse the provisional obviousness-type double patenting rejection, since Claim 1 of copending Application Ser. No. 10/165620 does not recite a method of manufacturing an optical fibre where the Reynolds number is in accordance with the formula $120 < Re < 285$ during the deposition process, as recited in Claim 1 of the present application. Furthermore, as discussed above, the Geittner et al. reference and the Roba reference both fail to supplement this deficiency. The Official Action notes that the Geittner et al. reference discloses that the reaction takes place in the laminar flow, however there is no suggestion in the Geittner et al. reference that the Reynolds number is in accordance with the formula $120 < Re < 285$. In this context , the Applicants have attached an Appendix hereto that includes a copy of pages 276-278, of University Physics, sixth Edition, November 1981. On page 277, fourth paragraph, is stated that when the Reynolds number is less than about 2000 the flow is laminar, whereas above about 3000 the flow is turbulent. In the situation that the Geittner et al. reference describes that the reaction takes place in the laminar flow, the Reynolds number should be less than about 2000. However, there is no information in any of the prior art documents that the Reynolds number is in accordance with

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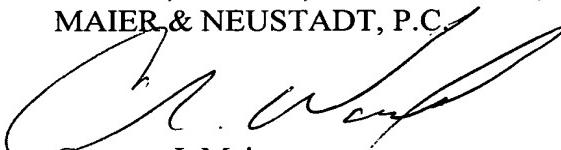
the formula 120<Re<285 as recited by present Claim 1. In addition, the experimental data on file now clearly demonstrate that the limits are supported by experimental and unexpected results.

Accordingly, the Applicants respectfully request the withdrawal of the obviousness-type double patenting rejection.

Consequently, in view of the above discussion, it is respectfully submitted that the present application is in condition for formal allowance and an early and favorable reconsideration of this application is therefore requested.

Respectfully Submitted,

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